

## **Planar Microfluidic Membraneless Fuel Cells**

### Award Information

Agency:  
Department of Defense

### Branch

Army  
Amount:  
\$100,000.00

### Award Year:

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Program:  
STTR

### Phase:

Phase I  
Contract:  
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Solicitation Number:

n/a

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N

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## Abstract

The objective of this proposal is to demonstrate the feasibility of developing compact 1-10 W fuel cell systems based on the novel, revolutionary, concept of planar microfluidic membraneless fluid cell (PM2FC) recently invented and demonstrated by the authors of this proposal. The PM2FC concept is closely related to microchannel, membraneless fuel cells (MMC's) that have been previously described in the literature. Just as for MMC's, the PM2FC concept is based on laminar flow of fuel and oxidant solutions separated by a virtual membrane that allows for proton conductivity, while minimizing mixing of the two solutions. The novel PM2FC design proposed offers an exciting opportunity for fabricating industrially-scalable models of 1-10W (and ostensibly higher) membraneless fuel cells. Issues that will be addressed in the Phase I of this project include: (1) cell geometry optimization; (2) materials issues, such as electrode type and microstructure; and (3) new fuel/oxidizer combinations, emphasizing those that have proven unsuitable for conventional PEM-based fuel cells. The need for a compact, reliable, light fuel cell, capable of increased power and fewer logistics problems cannot be overstated. Both military, Army in particular, and industry are working intensely on developing such devices. The PM2FC design, if successful, will open remarkable opportunities both for federal and civil markets. In this case, -9 2-6.LLC will enter in R&D agreements with ARO and ARL, to assure that the new fuel cell will be designed and built according to the military specifications in the shortest possible time. In the commercial sector, the company plans to pursue various applications, mainly in small power sources for consumer electronics - the market that might grow extremely rapidly in the coming years. The plan is to build a successful manufacturing facility in Ithaca, NY, - an area with a high concentration of skillful labor, which, unfortunately, has lately seen a significant economic downturn.

\* information listed above is at the time of submission.